Real Time Snow Water Equivalent (SWE) Simulation
April 24, 2012
Sierra Nevada Mountains, California

Introduction

This report is a beta product and subject to revision. We have developed a real-time SWE estimation scheme based on historical SWE reconstructions between 2000-2009, a near real time MODIS image, and daily in situ SWE measurements for the Sierra Nevada in California. Real-time SWE will be released on a weekly basis during the maximum snow accumulation/ablation period.

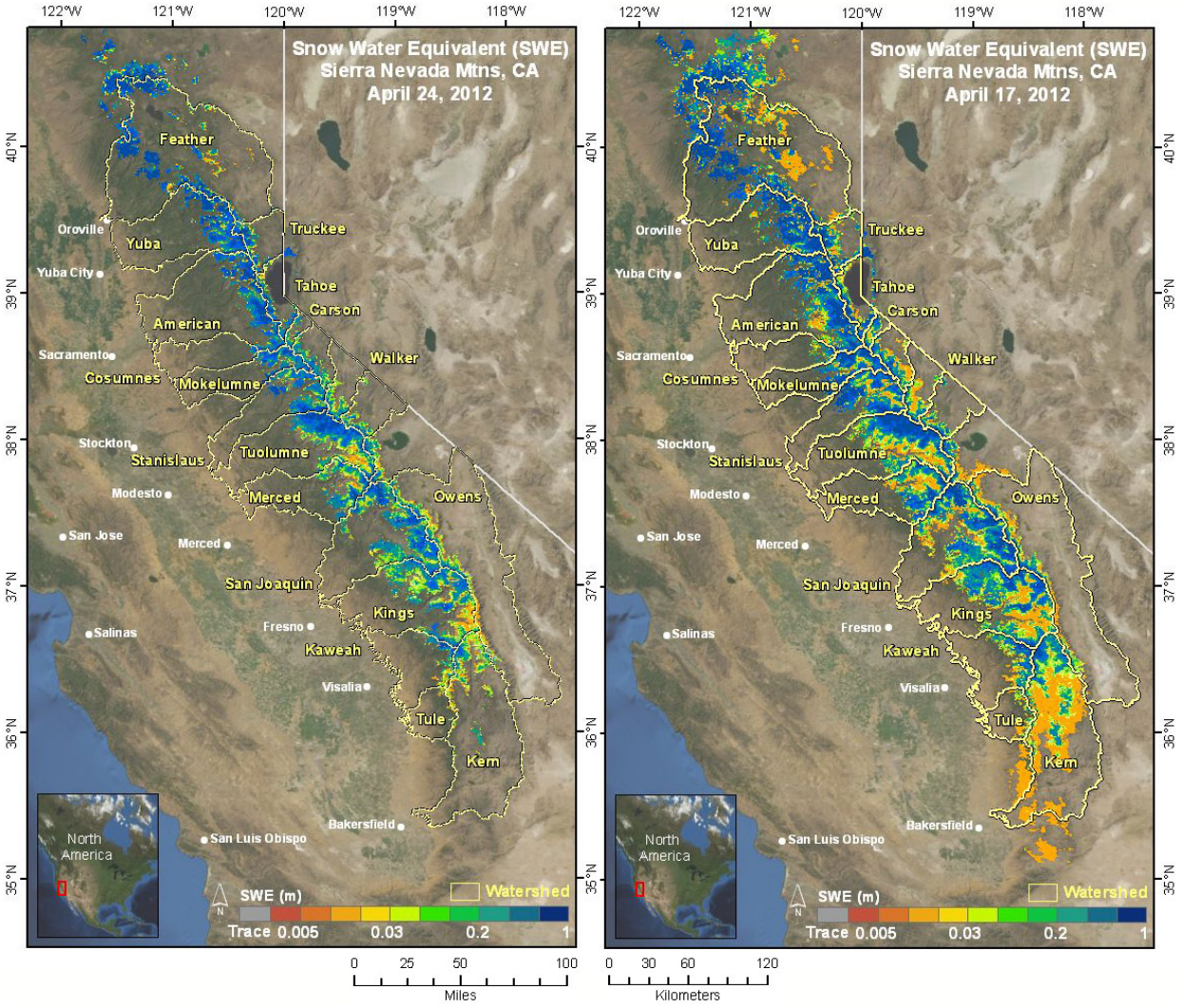

Figure 1. SWE amounts for April 24, 2012 are shown on the left and SWE amounts for April 17, 2012 are shown on the right.

Discussion

The most recent cloud-free MODIS/MODSCAG image available is for April 24, 2012. Figure 1 shows SWE amounts for April 24, 2012 on the left and SWE amounts for April 17, 2012 on the right. Depth of SWE has decreased between April 17, 2012 and April 24, 2012, with an overall decrease in snow extent. Figure 2 shows the percent of average SWE for April 24, 2012 for the snow-covered area, with all areas above 3000' shown in light blue. Snow is melting and a few areas in the Feather and higher elevations are close to normal, but most watersheds are well below average. Table 1 shows the average SWE above 3000' by watershed for 4/24/2012, 4/17/2012, the percent of average for 4/24/2012 and the change between 4/17/2012 and 4/24/2012. There are many zero values between 3000' and 5000', which are included in the mean calculations, bringing mean values much below those calculated from sensor data.

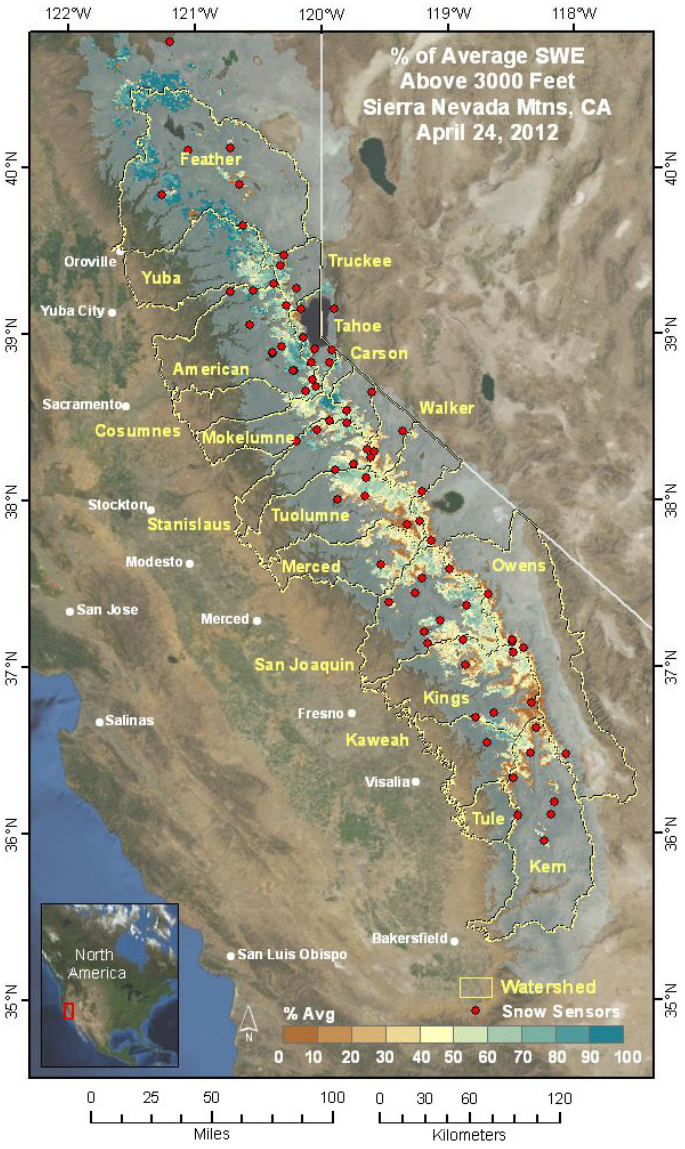

Figure 2. Percent of average SWE for April 24, 2012 for the snow-covered area above 3000'. Area above 3000' is shown in light blue.

Methods

Results for the date of April 24, 2012 are based on April 24, 2012 real-time data from 76 in situ SWE measurements distributed across the Sierra Nevada, one Moderate Resolution Imaging Spectroradiometer (MODIS)/Terra Snow cover daily cloud-free image which has been processed using the MODSCAG fractional snow cover program (Painter, et. al. 2009), a normalized reconstructed SWE image for March 1, 2006, and an anomaly map based on 10 years of modeled SWE (2000-2009). This year the near real time SWE product is an iterative process, we are refining the processing as we get better data and develop better methodology. Relative to snow stations and the NWS SNODAS product, the reconstructed SWE product correlates strongly with full natural flow, especially late in the snowmelt season (Guan, et. al.).

Table 1. Mean SWE above 3000 feet for 4/24/2012, shown by watershed.

Watershed	4/24/12 SWE (in)	4/24/12 % Avg to Date	4/17/12 SWE (in)	4/17 thru 4/24 Change in SWE (in)
AMERICAN	7.07	22.24	13.61	-6.54
FEATHER	4.64	15.41	8.50	-3.86
KAWEAH	2.80	10.93	7.14	-4.34
KERN	0.93	5.34	2.89	-1.96
KINGS	5.12	18.65	8.90	-3.78
TAHOE	9.96	33.14	16.20	-6.24
MERCED	4.34	15.92	7.74	-3.40
OWENS	1.11	6.50	1.84	-0.73
SAN JOAQUIN	7.46	25.31	11.79	-4.33
STANISLAUS	7.12	22.61	13.87	-6.76
TRUCKEE	5.87	19.37	9.85	-3.98
TUOLUMNE	7.15	21.68	11.08	-3.93
YUBA	9.35	30.26	14.37	-5.02
COSUMNES	0.79	2.92	3.07	-2.27
MOKELUMNE	6.93	23.58	15.37	-8.44
TULE	0.16	1.28	1.59	-1.43
WEST WALKER RIVER	3.28	11.07	4.27	-0.99
EAST WALKER RIVER	2.06	7.59	3.06	-1.00
WEST FORK CARSON RIVER	5.96	31.41	11.79	-5.83
EAST FORK CARSON RIVER	4.52	21.63	6.64	-2.11

Current Meteorology

Between April 17th and April 24th, 2012, there was 0 snowfall at all resorts across California.

This week temperatures are average, some gusty winds today, and possibly some new snow on Thursday.

Location of Past Reports

ftp://snowserver.colorado.edu/pub/fromLeanne/forCADWR/

References

Guan, B., N. P. Molotch, D. E. Waliser, S. M. Jepsen, T. H. Painter, and J. Dozier. Snow water equivalent in the Sierra Nevada: Blending snow sensor observations with snowmelt model simulations. Submitted to *Water Resour. Res.*

Painter, T.H., K. Rittger, C. McKenzie, P. Slaughter, R. E. Davis and J. Dozier, 2009. Retrieval of subpixel snow covered area, grain size, and albedo from MODIS. *Remote Sensing of the Environment*, 113: 868-879.